“Market study for the import of wood pellets from Russia to Finland”

“Bioenergy, a great opportunity for our energy system, our economy and to maintain our well being.” Heinz Kopetz

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ARCADA 2011

DEGREE THESIS	
Arcada	
Degree Programme:	International Business
Identification number:	2978
Author:	Irina Ratkovskaya
Title:	Market study for the import of wood pellets from Russia to Finland
Supervisor (Arcada):	Henry Ericsson
Commissioned by:	Andreas Strenius

Traditional fuels - oil, gas and coal - are non-renewable energy sources, thus the world is looking for alternative fuels. Bioenergy is coming with a fast paste into the picture. Russia's prospects in the processing of bioenergy are almost unlimited, as the stocks of raw materials are huge. Pellets are a type of wood fuel that is produced from compacted sawdust under high pressure, without chemical fixers.

Russian company Ltd. "BioCalorien", located at the Leningrad Region, Podporozhje town is engaged in production of wood pellets. The purpose of the thesis is to aid the company in entering the Finish market, by studying the prices, the market, the cultural differences and providing a penetration scheme of imported Russian pellets to Finland.

Taking into account the price comparison, there is a clear prove that there is a big potential for Russian companies to enter the Finish wood pellet market. The net price of 1 ton of Russian produced pellets differs with 100 Euros from the domestic prices. As an advantage, pellets are much greener than traditional fuels: 10 - 50 times less carbon dioxide emissions into the air.

In today's world one of the most important challenges is to preserve the earth environment that would ensure a safe and comfortable future. Wood pellets is a excellent solution, as there will be more competition on the market, the prices could decrease, which would lead to increased consumption.

Keywords:	Wood, pellets, biofules, Russia, import, bioenergy
Number of pages:	50
Language:	English
Date of acceptance:	12.05.2011

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I. Introduction

1.1. The research task- Market study for the import of wood pellets from Russia to Finland

Nowadays there is a great demand for bioenergy that can be cheap and efficiently used in every sphere of our social life. The world is now looking for alternative fuel sources. Petroleum based fuels can be subsidized by biofuel, which is more of an environmentally friendly solution.

It is crucial to mention that bioenergy is a renewable energy that is taken from materials derived from biological sources. In terms of its broader sense it consists of biomass, which is a biological material that is used as a biofuel. These terms must not be confused. Bioenergy is energy extracted from biomass, and biomass is the fuel.

Biomass is an organic substance that consists of sunlight stored in the form of chemical energy. As a fuel it consists of wood, wood waste, straw, sugar cane, and many other byproducts from a variety of agricultural processes. (A, 2009, pp. 108-117)

Traditional fuels - oil, gas and coal - are non-renewable energy sources. Sooner or later they would have to be replaced. Alternative energy sources are already used in developed countries. Among the most popular types of alternative energy - wind, solar, geothermal energy and hydroelectric - biofuel occupies an important place: its share in alternative sources is more than 30%.

On the other hand, the Kyoto Convention secured commitments by developed countries and countries with economies in transition to limit and reduce the greenhouse gases. It is obvious that the result of the implementation of measures under the Convention, for most countries is to create energy, running on alternative fuels.

Hence many new products can help in bioenergy production. Pellets are one solution. Pellets are a type of wood fuel that are commonly produced from compacted sawdust.

Many pellet stoves, central heating systems, and other heating machines were developed at the end of the 19th century, and nowadays are still developing. In 2005 there

was a harsh increase of price of fossil fuels, which was followed by the increased demand for pellet heating in Europe. Therefore considerable industry is emerging. (Wood pellets, 2011)

As a result the need for development of innovative methods and products for bioenergy is quite obvious and draws much attention to investigate new and sufficient biofuel and bioenergy methods for their further implementation.

This thesis investigated the production of pellets in Russia as a new product for bioenergy supply available nowadays. Scientific resources have been analyzed and studied in order to make a precise and correct situation of pellet manufacturing and implantation in the Finnish market.

The main idea is to research one company located in Lenningradskaya oblast, Russia, the company's possibilities in widening their market and as a result starting to export their product (pellets) to Finland. As the company is interested in a potential new client (Finland), my role is to provide consulting advices to the company on how it can be achieved. The Finnish market will be studied, the cultural differences between Finland and Russia will be clearly stated as to avoid conflicts and possible failure due to cultural misunderstandings. Furthermore, the possible penetration scheme of imported Russian pellets to Finland will be provided.

1.2. Methods

For the methods, this thesis used various Internet sources, research papers and two interviews.

II. The notion of Bioenergy and its role in EU in our time.

2.1. General characteristics of Bioenergy

As the world's oil production suffered an inevitable decline, its market prices rose and the environment affected the production of biofuels, as it reached great volumes over the last 10 years. Numerous international organizations and political parties are discussing the different options for intensified use of biofuels.

The rise in the usage of biofuels is obvious, that's why there is a special international co-operation, regulations and certification mechanisms concerning the use of land, the mitigation of environmental and social impacts caused by biofuel production. (José C. Escobar, 2009)

Accordingly, biofuels are a large range of fuels which are originated from biomass. The term is connected with different biogases, liquid fuels and solid biomass. (Wikipedia, 2011)

Fuels**,** liquid or gaseous fuels extracted or fabricated from solid earth materials that are rich in hydrocarbons—compounds containing hydrogen and carbon. Although similar in composition to gasoline, synthetic fuels are not refined from petroleum, but are extracted instead from coal, oil shale, tar sands, natural gas, and biomass (plants and plant-derived substances). For example, coal can be converted into liquid fuel by a process called liquefaction, and oil can be extracted from oil shale by a process called retorting. Natural gas is converted into fuel-ready liquid by using gas-to-liquids technology. (Synthetic Fuel, 2011)

Biofuels can be synthesized from a variety of plants and grains. For example, soybeans and rapeseed can be processed into a diesel-like fuel. Corn and sugarcane can be fermented into alcohol. Other organic matter, such as wood, paper, and grass, can also be synthesized into alcohol when certain fermentation-triggering fungi (organisms that decompose organic matter) are added. Biomass alcohol is mixed with gasoline (in a 1:10 alcohol to gas ratio) in certain urban regions to reduce automobile emissions.

Liquid fuels such as alcohol, ether, and oil can be produced from plants and plant-derived substances, known collectively as biomass. These liquid fuels, sometimes referred to as biofuels, are derived from the chemical energy released by plants in photosynthesis. (Microsoft encyclopedia Encarta, 2001)

Major benefits of biofuels:

Economic impacts:	*Environmental impacts:*	*Energy security:*
Sustainability	Greenhouse gas reductions	Domestic targets
Fuel diversity	Reducing of air pollution	Supply reliability
Increased number of rural manufacturing jobs	Biodegradability	Reducing use of fossil fuels
Increased income taxes	Higher combustion efficiency	Ready availability
Increased investments in plant and equipment	Improved land and water use	Domestic distribution
Agricultural development	Carbon sequestration	Renewability
International competitiveness		
Reducing the dependency on imported petroleum		

(Demirbas, p. S109)

2.2. Synthetic fuels

Synthetic fuels as well as petroleum-based fuels can be used for different purposes. They are applicable in transportation, manufacturing, businesses, and homes. As production of synthetic fuels is more costly than refining petroleum, its usage is not so widespread. (Energy Sources and How We Utilse Them, 2011)

Production of synthetic fuels involves complex industrial processes. After hydrocarbons have been extracted from coal, oil shale, natural gas, tar sands, or biomass, the chemical structures of these hydrocarbons are rearranged, by means of chemical reactions to form synthetic fuels.

2.2.1. Coal

Coal is a solid fossil fuel which is created from ancient land plants that died and were slowly buried under layers of sediment. As these overlying sediment layers built up over millions of years, increasing heat and pressure transformed the submerged organic material into coal. Traditionally, coal has been burned to provide heat and power for residential and manufacturing needs. More recently, this fossil fuel has also been burned in coal-fired power plants to produce electric power. (How are the fossil fuels formed? , 2009)

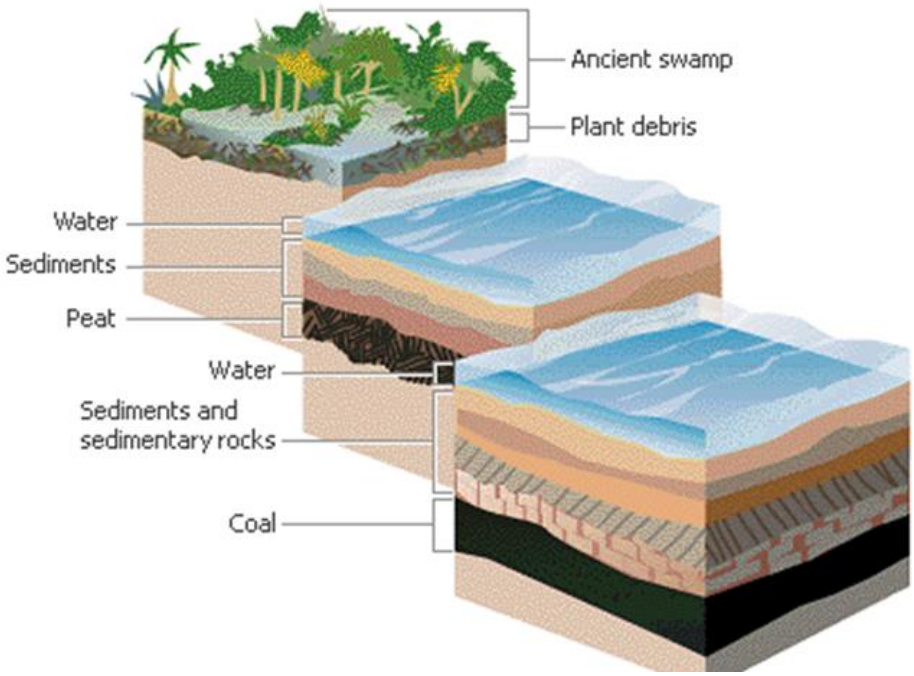


Fig.1 How coal is formed (Microsoft Corporation)

Coal can be synthesized into both gas and liquid fuels. Coal is synthesized into vapor fuel by a process known as gasification. This process is carried out by heating coal in the presence of steam and oxygen to produce synthesis gas, which is a mixture of carbon

monoxide, hydrogen, and methane. Synthesis gas can be burned as fuel or treated further to produce cleaner-burning gas.

Coal can also be converted to gas without being removed from the ground. Underground gasification is accomplished by drilling shafts down into a coal seam, igniting the coal deposit, and then pumping steam and oxygen down into the burning coal bed. This process produces synthesis gas, which is removed from the coal deposit through separate vents.

Coal liquefaction converts coal into a liquid fuel that is similar in composition to crude petroleum. Several techniques are used in coal liquefaction. In the first method, called indirect liquefaction, coal is gasified, forming carbon monoxide, hydrogen, and methane. The carbon monoxide and hydrogen are extracted and combined in the presence of a catalyst—a substance that triggers a reaction without being chemically altered. This reaction produces liquid fuel. A second technique for coal liquefaction, called catalytic liquefaction, adds hydrogen gas to solid coal in a high-pressure chamber, and this combination is then heated in the presence of a catalyst. When cooled, this mixture forms a liquid fuel. A third process, called solvent extraction, adds a liquid solvent to solid coal. The solvent dissolves certain hydrocarbons in the coal, forming a solution that is mixed with hydrogen to produce a liquid fuel. A fourth method known as pyrolysis, heats solid coal to high temperatures in the presence of hydrogen gas. This heating process cleaves (breaks apart) the coal molecules at their weakest points, allowing hydrogen to attach to the new molecules, which form liquid coal fuel. These coal liquefaction processes have been thoroughly tested and some of these methods are used extensively in certain parts of the world.

2.2.2. Oil shale

Oil shale is a fine-grained sedimentary rock that is similar in composition to limestone or shale, except that oil shale contains up to 25 percent solid organic material. The hydrocarbons in oil shale can be synthetically converted to petroleum by a heating process known as retorting. First, oil shale is mined as a rock and then it is pulverized into fine particles. The resulting powder is heated to about 500° C (about 932° F) in a retorting

furnace. As the powder is heated, oily hydrocarbons are driven from the pulverized rock, and these hydrocarbons are collected.

Similar to the gasification of underground coal deposits, oil shale retorting can be carried out in underground oil shale beds. Underground retorting is carried out by boring down into oil shale deposits and igniting the hydrocarbon-rich rock in order to drive off the oily hydrocarbons. These hydrocarbons are then drained, collected, and pumped to the surface. Depending on the quality of the oil shale and the efficiency of the retorting process, up to 379 liters (100 gallons) of crude petroleum can be extracted per ton of rock.

2.2.3. Tar sands

Tar sands are sedimentary sandstone that is impregnated with an organic material called bitumen—a solid or highly viscous oil that can compose up to 20 percent of the sandstone by weight. Bitumen cannot be pumped directly from tar sands because of the oil's asphalt-like consistency. It must be recovered from excavated tar sands either by heating the rock in retort furnaces or by treating the rock with solvents. The hydrocarbons that are extracted can then be processed in special refineries built to handle the tarlike bitumen and remove the high quantities of sulfur generally found in this organic material.

Fig.2 Crude oil production (Vancouversun, 2010)

In a process similar to underground coal gasification and underground oil shale retorting, bitumen can be extracted from underground tar sands deposits by injecting steam down a shaft into the source rock. The softened hydrocarbons can then be pumped up to the surface.

2.2.4. Petroleum

Petroleum is mainly formed from ancient, microscopic plants and bacteria living in the ocean and saltwater seas. When they died and settled to the seafloor, they mixed with sand and silt, forming organic-rich mud. The layers of sediment gathered over this organic ooze, heating the mud that was slowly compressed into shale or mudstone and chemically transformed the organic material into petroleum and natural gas. (How are the fossil fuels formed? , 2009)

2.2.5. Natural gas

Natural gas is formed from plankton, tiny water-dwelling organisms. These organisms include algae and protozoans. Plankton is accumulated on the ocean floor as they died. These organisms were slowly buried and compressed under layers of sediment. The pressure and heat were generated by overlying sediments and converted this organic material into natural gases known nowadays. Natural gas consists mostly of methane and other light hydrocarbons. So, natural gas can migrate through porous and fractured reservoir rock with petroleum and subsequently can accumulate in underground reservoirs. It forms a layer over the petroleum. It may also form in coal deposits, where natural gas is often found dispersed throughout the pores and fractures of the coal bed. (Uses Of Petroleum, 2011)

2.2.7. Fossil fuels

Fossil fuels are energy-rich substances formed from long-buried plants and microorganisms. They include petroleum, coal, and natural gas, providing most of the energy for power of modern industrial society. (How are the fossil fuels formed? , 2009)

Fossil fuels are mostly used in such spheres as transportation, manufacturing, residential heating, and electric power-generation industries. There is a notion called crude petroleum that is refined into gasoline, diesel fuel, and jet fuel, powering the transportation system of the whole world. Coal is considered to be the most common fuel that can be

burned for generation of electric power. Natural gas is primarily used while construction and maintaining of commercial and residential buildings for heating water and air, for air conditioning, and as fuel for stoves and other heating appliances. (Fossil fuels, 2011)

Because significant amounts of energy and other raw materials are required to produce synthetic fuels, these fuels are typically more expensive to produce than petroleum-based fuels. However, as technology advances and means of producing synthetic fuels become less expensive, synthetic fuels may become more price-competitive with petroleum.

Except for the biomass-fermentation process, liquid fuel synthesis has changed little since the process was first developed in Germany during the 1930s. This first technique, called the Fischer-Tropsch process, used steam and oxygen to produce coal gas, which was then liquefied by a catalytic reaction. The Fischer-Tropsch process was used to manufacture nearly 600,000 metric tons of synthetic coal fuels each year during World War II (1939-1945).

In addition to direct combustion for commercial uses, fossil fuels are also burned to generate most of the world's electric power. Coal-fired power plants produce 37 percent of the world's electrical power, while petroleum and natural gas generate a combined 25 percent. Since the late 1970s, however, the total proportion of fossil fuel-generated electricity has decreased worldwide from 71 to 62 percent. In 1996, 38 percent of the world's remaining electricity supply was generated by a combination of nuclear fission (17 percent), hydroelectric power (19 percent), and solar, geothermal, and other sources (2 percent).

Although cost factors have discouraged development of many types of synthetic fuels, research efforts continue to focus on developing certain types of these fuels. Gas-to-liquids technology shows great promise as a means for converting natural gas into liquid fuels that can be burned by automobiles. Should gas-to-liquids technology become price-competitive with petroleum-based fuels, the world's enormous natural gas deposits could be used to supplement petroleum and other liquid fuels. (Microsoft encyclopedia Encarta, 2001)

Therefore, it is necessary to conclude that biomass is a contraction for biological mass, the amount of living material provided by a given area of the earth's surface. The

term is often associated with biomass energy, featuring the fuel energy that is mostly derived directly or indirectly from biological sources following several important processes. Biomass energy from wood, crop residues, and dung is the primary source of energy in developing regions that is widely used nowadays. Biomass is a major source of power available. Many research works aim at developing of biomass energy, but economic competition with petroleum is still keeping these efforts at an early developmental stage. (Sources Of Energy Essay, Research Paper , 2011)

In 1996 the world consumed 72 million barrels of petroleum, 12.8 million metric tons of coal, and 6.4 billion cubic meters of natural gas on a daily basis.

2.3. Wood products

Nowadays forest industry provides us with wood, paper, chemicals, energy, and other products made from trees. The forest industry consists of the lumber industry, including different businesses that convert trees, or timber, into lumber products. The received products are widely used in different spheres of our life. So with its help we can use such important things as tables, chairs, desks, and other furniture that is made from wood. We use produced paper for newspapers, magazines, and books production. In business, wood is required for pallets and wood containers.

Wood can be used in different spheres for many reasons. Subsequently wood becomes more accessible and abundant. The forests are cut and wood is processed more efficiently. On the positive side forests can be renewed making it possible for new trees to be cultivated and harvested. As there is a great number of tree species growing in the whole world, they provide wood featuring strength, durability, and other physical and mechanical properties, including visually attractive grains, textures, and colors.

In forest industry terminology the trees used as raw material are often classified as softwoods or hardwoods. Softwoods are also called conifers. They belong to the group of plants commonly known as gymnosperms, which means flowerless seed-bearing plants. They comprise pines, cedars, spruces, larches, and firs. They are common in the world's temperate and boreal (northern) regions. Hardwoods belong to the group of plants that are known as angiosperms or flowering plants. They consist of broad-leaved tree species such as oak, maple, beech, walnut, mahogany, teak, and balsa. (Forest Industry, 2011)

More than a half of the wood harvested worldwide each year is used directly as fuel for heating and cooking. In addition, wood industries often burn by-products such as bark, sawdust, and scrap wood to produce energy for the manufacturing process.

Methyl alcohol (CH3OH), also called methanol and wood alcohol, can be made by the fermentation or hydrolysis of wood cellulose. Methanol, more commonly known as wood alcohol, is used for automobile fuel in countries such as Brazil and can also be combined with gasoline to form gasohol.

In countries that have well-developed wood-processing industries and markets for wood products, such as the United States, Canada, and the countries of western Europe, almost all tree parts are used to make different types of forest products with little waste. The total dry weight of a tree's leaves, branches, stem, and roots is its biomass. For example, the biomass of a Douglas fir 41 cm in diameter is about 3 percent leaves, 8 percent branches, 72 percent stem, and 17 percent stump and roots. The upper section of the tree stem is typically too small to be used. However, advances in wood-processing technologies are making it possible for lumber and other forest products to be made from smaller logs—in some cases logs as small as 5 cm in diameter can be converted into wood products. The amount of wood that can be harvested depends on the tree species, the tree's size, and the straightness and forking of the stem. Assuming average straightness, about 60 to 70 percent of a Douglas fir tree 41 cm in diameter can be harvested into logs. What remains of the tree is typically left in the forest to decompose into soil nutrients.

Once a log is transported to the mill, little wood is wasted. Sawmills and veneer mills generate by-products including chips, sawdust, shavings, and bark. Chips are sold to make paper. Sawdust and shavings are sold to make particleboard or are burned as fuel to dry lumber. Bark is used in the manufacture of chemicals or is sold for landscaping. Peeler cores (long, thin log centers left after veneer has been cut from the log) are often used for fence posts or are sawn into lumber studs.

In contrast to the high utilization of forest products in developed countries, developing countries tend to use only the best, most valuable logs, leaving forest waste behind. In addition, developing countries have relatively few, widely scattered mills and have transportation systems that make it difficult to ship waste products from one type of forest-products industry to others that could use them. As a result, developing countries

often waste large amounts of potentially valuable forest by-products. (Microsoft encyclopedia Encarta, 2001)

2.4. The main European Commission requirements on usage of Bioenergy

Today the European Commission adopted a decision to support businesses, governments and nongovernmental organizations to establish systems for certification of all biofuels, including ones imported into the EU. It has determined the order of certification that should be followed to obtain approval of the European Commission. It will help bring into force the EU requirements regarding the fact that biofuels should significantly reduce greenhouse gas. Certification regulations are part of the basic principles that explain how to implement the Directive on renewable energy, which comes into force in December 2010.

Guenther Ottinger, a member of the European Commission on energy issues, said: " In the years to come, biofuels are the main alternative to petrol and diesel used in transport, which produces more than 20% of the greenhouse gas emissions in the European Union. We have to ensure that the biofuels used are also sustainable. Our certification scheme is the most stringent in the world and will make sure that our biofuels meet the highest environmental standards. It will have positive effects also on other regions as it covers imported biofuels." (Commission sets up system for certifying sustainable biofuels (10/06/2010), 2011)

A package of documents was created; it includes two Communications and Decision of the European Commission, which should aid businesses and EU member states to apply the Renewable Energy Directive. These documents focus on the sustainability criteria for biofuels.

Certificates on biofuel sustainability: The European Commission recommends that businesses, governments and NGOs would adopt "voluntary schemes" for certification of biofuel sustainability and describes the standards that must comply with biofuels in order to get recognition from the EU. One of the main criteria is the presence of independent auditors, the auditors of the entire chain of production: from the farmer and the mill by the seller to the fuel supplier, which delivers gasoline or diesel fuel at a petrol station. There are rules and standards in order for the audit to be reliable and avoid fraud.

Protection of untouched nature: The European Commission states that biofuels should not be produced from raw materials derived from tropical forests, or from areas where forests have been cut down recently, from the dried peat bogs, marshes or areas of high biodiversity, and explains how they must be qualified.

Development of only those biofuels that deliver low greenhouse gas emissions: The report of the European Commission once again points to the fact that the EU member states should strive to address the mandatory government targets for renewable energy, and that government is interested only in biofuels with low levels of greenhouse gases, and explains how to calculate this figure. Biofuels must reduce greenhouse gas emissions by at least 35% in comparison to fossil fuels, this figure should rise to 50% in 2017 and to 60%, for biofuels from new plants in 2018.

The RES Directive on renewable energy from April 23 2009 set a European goal that the share of renewable energy sources should reach 20% of all energy consumed by 2020. This directive is reflected in the mandatory implementation of state for the EU member states. Individual EU countries must achieve individual state general use of renewable energy. In addition, concerning the transport sector, all the EU member states must achieve a common goal: the share of renewable energy sources should reach 10%.

The renewable energy includes solid biomass, wind, solar and water energy, and biofuels. However, only those biofuels which meet accepted standards of reliability in the EU are objectives set by the Directive.

In February 2010, the European Commission's report on sustainability requirements for the utilization of solid and gaseous biomass sources in electricity, heating and cooling was published. It proposed non obligatory recommendations on sustainability criteria to be used by the Member States that would like to launch a scheme at national level, in order to avoid problems for the functioning of the internal market for biomass. At this stage, a proposal for with obligatory sustainability scheme was not created.

The report underlines that 90% of biomass consumed in the EU would come from European forest. EC report presents recommendations which relate to:

- "ban on the use of biomass from land converted from forest, other high carbon stock areas and highly biodiverse areas"

- “a common greenhouse gas calculation methodology which could be used to ensure that minimum greenhouse gas savings from biomass are at least 35% (rising to 50% in 2017 and 60% in 2018 for new installations) compared to the EU's fossil energy mix”
- “the differentiation of national support schemes in favour of installations that achieve high energy conversion efficiencies”
- “supervising of the origin of biomass”

The sustainability criteria should not the applied to wastes, as these must already fulfill environmental rules in accordance with waste legislation at national and at European level. (Sustainable Bioenergy, 2010)

In this chapter, numerous forms of bio-fuels have been presented. Ensuing a closer look at the original topic, wood pellets, where wood is a bio-fuel and pellets are a convenient way of packaging and distributing wood-based fuel. Pellets will be described with details, the production process will be explained, as well as the advantages of pellets over other forms of fuel will be stated.

III. Pellets: their advantages and production

Generally, the production of pellets is not a modern discovery. This technology has been known since the XIX century, but the granulation of timber for subsequent combustion in heating devices has spread relatively recently.

About 20 years ago, Rudy Gunnerman of Bavaria, who is now living in the United States, produced pellets from wood waste, using it for non-waste production and transportation cost. Later in the USA pellets were used for heating. First in Europe the process of granulation of wood waste and their use in heating appeared in Sweden. In the early 90's in Sweden there was a boom in the industrial production of wood pellets. Later, the rapid development took part in selling wood pellets in Finland, Italy, Germany, Canada, Holland, Denmark, Austria, Norway and France. In the early 21th century the production of pellets in Russia began. Today the production of fuel pellets from waste wood is one of the most promising technological processes. (Ecopellets, 2010)

Fig.3 Pellets (Karelexpo, 2009)

3.1. Definition of wood pellets

According to scientific definition, fuel pellets are a solid energy carrier, produced by mechanized biomass.

Wood pellets are cylindrical extruded products from dried natural wood, such as: sawdust, shavings, flour from work of sawing machines, chips, and remnants of forest wood. Wood pellets are manufactured under high pressure without chemical fixers. Fuel pellets can be manufactured from other biological products: e.g. straw, peat, and hay.

In the production of fuel pellets initially part ground raw materials are used and afterwards they are granulated. Therefore they are called "improved" fuel. It is necessary to take into account both the appearance (shiny and smooth surface without bumps or cracks, light, pleasant smell, light wood color) and the following characteristics:

• pellet burning boiler furnace is carried out more efficiently: the number of residues (ash) is not more than 0,5-1% of the total volume of pellets;

• when burning pellets, they do not adversely affect the environment;

Taking into account all the parameters, it can be stated that in European countries, pellets are most often used for heating houses and buildings. (Raw materials and equipment for the production of pellets, 2007)

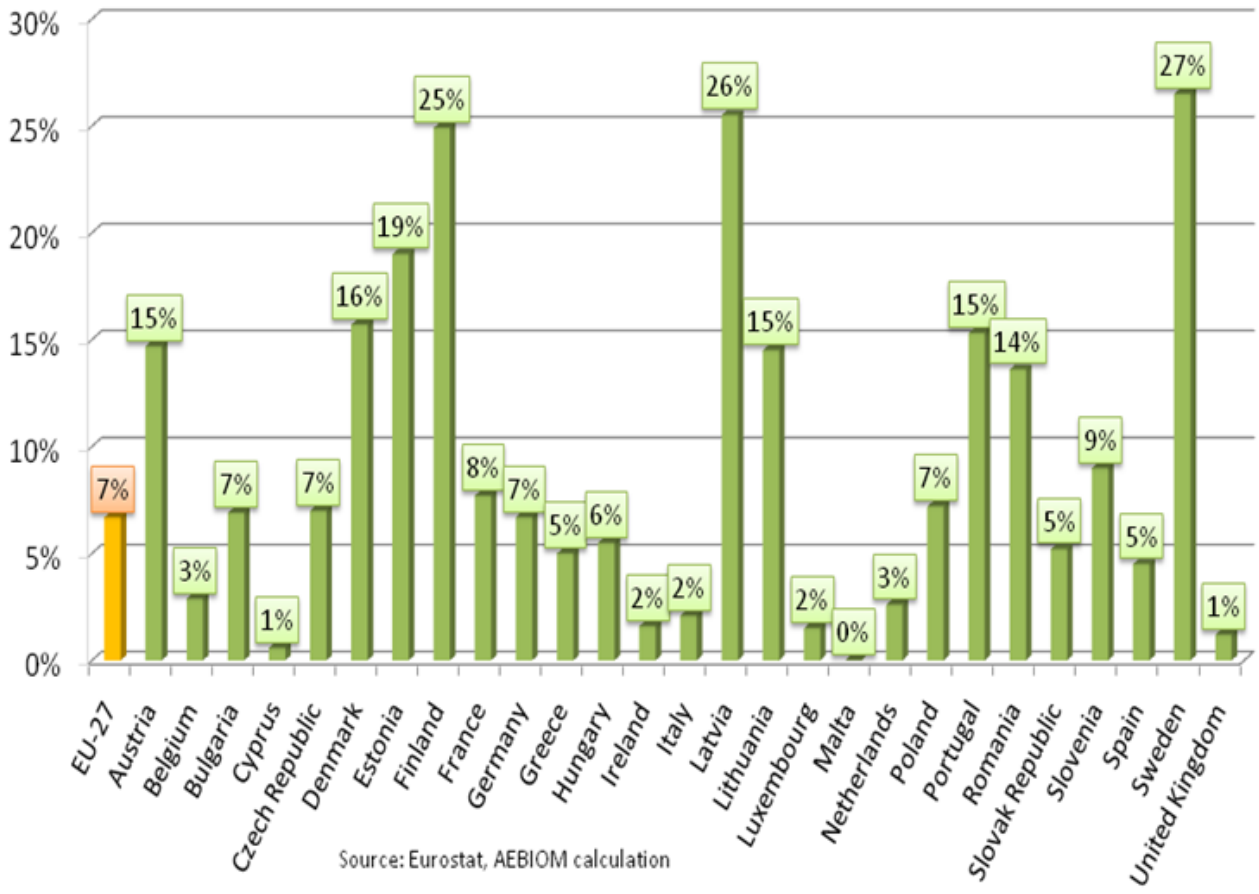


Fig.4 Biomass share of final energy consumption p.4 (Aebion Annual Report 2009)

The following graph shows the actual and expected development of the pellet production and consumption form 2000 till 2010. Europe is still the main producer and consumer of pellets. (Pellets, 2011)

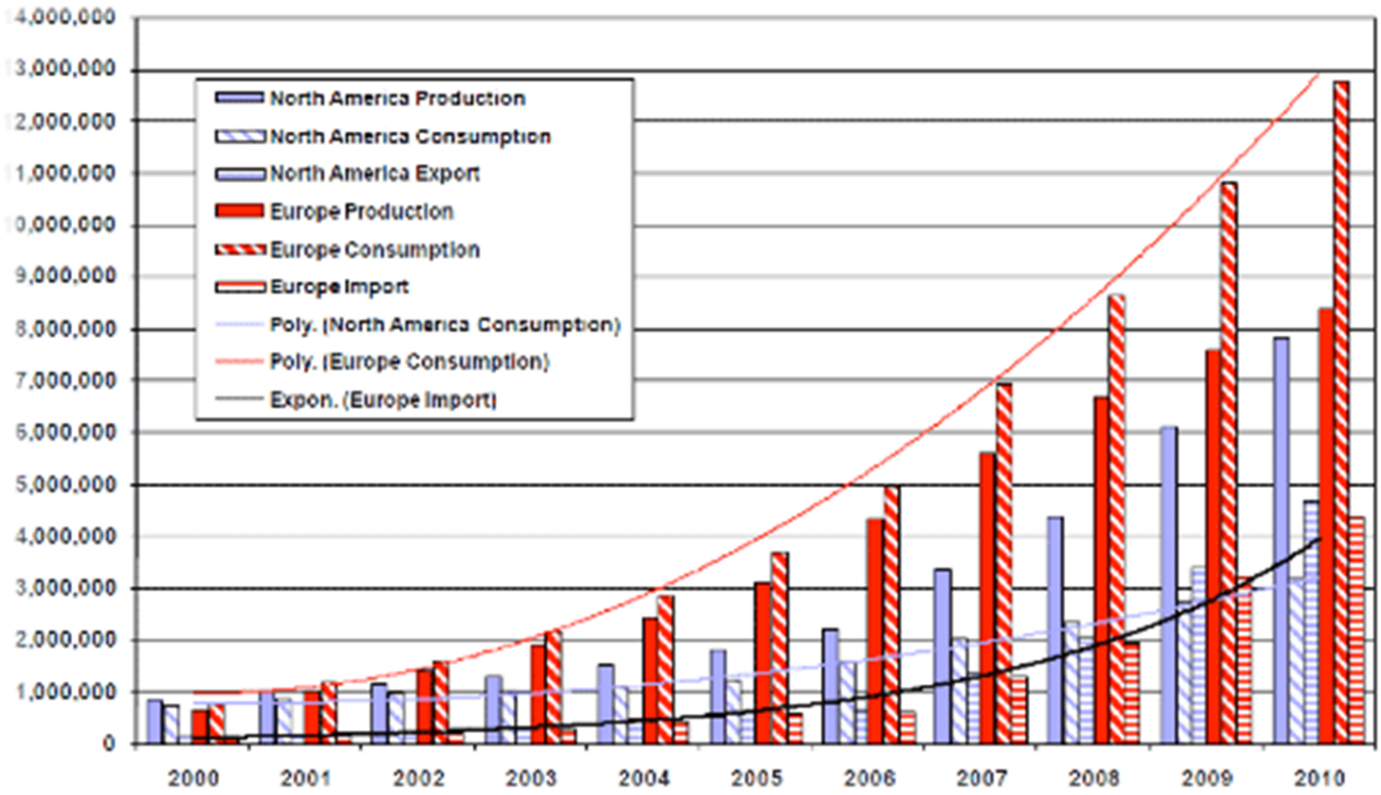


Fig.5 Development of the pellet production and consumption form 2000 till 2010 (Pellets, 2011)

There is a great demand for wood pellets in Europe. Industrial demand in Europe is combined with greater usage of wood pellet-fired furnaces by residential and commercial customers. Other countries suffer their lack. For example, “In the United States you have a nascent wood pellet industry but given that so much of the United States is served by natural gas and natural gas heating to the home, we have not seen the same adoption here. Most of the wood pellets produced in the United States are exported overseas.” John Keppler (Chief Executive Officer of Envia, which is one of the world’s leading biomass energy companies) said.

In the last years, there has been the remarkable fluctuation between wood pellet demand and supply, which led to a fast rise in the price of wood pellets. When oil prices began to rise, it led to wood pellet burners sales increase. The supply was scarce to meet this new customer base, and as a result wood pellet prices started to rise. This was partly

due to limited supply of raw material softwood and hardwood by-products, but it is also due to how pellet manufacturing currently operates.

Large production has its advantages in energy efficiency, and when demand is great producing wood pellets at a lower price is possible due to the phenomenon of economies of scale.

However, the best solution is a combination of large scale and small-scale wood pellet production. Small-scale set-up requires less raw material supply to defend the investment and also set-up time and cost is less. As market competition due to the increase in wood pellet producers increases, it is possible to keep stable prices. (Demand for wood pellets: new challenge, 2007)

Currently the European market has a great demand for pellets with diameter of 6 - 8 mm, 10-15 mm long in bags of 15 - 25 kg.

It is a so-called "end product", because in such packing pellets reach the final consumer, who used pellets for heating homes. Pellets in this kind of packing have a maximum price. There is also a great demand for pellets placed in the «big-bags» volume from 1 to 1.5 cubic meters and weighing from 0,7 to 1,0 tons. Demand for wood pellets is higher than the supply, and this leads to higher prices in the market. (Production and sales of wood pellet, 2007)

3.2. Raw materials

Raw materials for production of fuel pellets are:

• Wood and wood waste - tree stumps, slabs, low marketable timber, wood chips, slabs, sawdust stumps, slabs.

• Waste from agricultural processing (straw, husks, shells) is also the fuel pellets. The main differences from the wood pellets are: color, high ash content. As for wood pellets, it is used for burner equipment, for industrial and domestic purposes.

The calculation of the required volume of raw materials for pellets production: 1 ton of pellets is either:

• 8 cubic meters of bulk raw natural humidity (chips, sawdust, wood chips)

• 5 bulk cubic meters dry raw material (chips, sawdust, wood chips)

• 2 cubic meters of (low marketable timber, slabs, etc.)

3.3. Production process

Wood pellets are manufactured under high pressure without the use of chemical fixing agents. Fuel pellets can be manufactured from other biological products: hay, peat, straw and so on. Major components for the production and realization of pellets are at least three, including raw materials, equipment and market.

Produced pellets (from bird droppings) is a highly organic fertilizer, the advantage of it is a high concentration of nitrogen and phosphorus.

Fig. 6 Organic pellets (Made in China)

The process of pellet production is the process of recycling industrial waste into solid fuel suitable for combustion. The moisture content of pellet should not exceed 12%, and the size of not more than 5,5 mm.

Shredding of waste wood

When the thickness of raw wood waste is larger than 10 mm, it is necessary to crush them using a crushing machine, and then use the hammer mill to smash them into powder form with a particle diameter of about 3 mm.

The process of drying sawdust

The ideal amount of moisture in the material used for pellets is equal to 13-15%. A dryer machine is able to reduce the moisture content of the material from 60% to 10%.

Fig.5 Dryer machine (Topserver, 2010)

Granulation of sawdust (produced by Swedish company SKF)

The granulator, which consists of the following parts, is an essential part of the production line of wood pellets from sawdust:

1. Lubrication system granulator operated by microcomputer monitors the temperature of the working surfaces. When the temperature rises above the norm, a microcomputer sends a signal to the lubrication system of the rollers and the matrix, thus solving the problem of wearing out of moving parts of the granulator. It is also possible to lubricate the working surfaces by hand.

2. High accuracy transmission gears of the material are provided by the drive. In the cylindrical matrix a method of fixing clamp is used that increases the processing speed

of the material as in the method of bolting. As a result, there is an increase of capacity by 10-15% compared with a flat matrix.

3. Roller mechanism and a cylindrical matrix of pellet are made of alloy steel, which heat treatment differs from the proposals of other manufacturers: the saturation of the surface of carbon steel - grouting is carried out at a depth of 2 mm, which allows to extend the life of more than 10 times the cylindrical matrix and the roller mechanism, thus, reducing operating costs.

Cooling of pellets

Since after the granulation temperature of pellets is 60-80 degrees, and moisture content - about 15%, for convenience of storing, the pellet moisture must be reduced by 3-4% with the cooling unit.

Taking into account the wishes of customers from different countries, a new type of cooling unit has been developed, allowing to reduce the moisture content to 7-8%, which is favorable for storage of pellets in areas with very high humidity.

Packing of pellets

In most cases, the use of pellets as fuel does not occur immediately after the cooling process, and after some time, during which they have to store and transport. In order to avoid their deterioration from moisture, pellets need to be packed. There is a special packaging machine.

In most cases, customers need a packaging machine that can pack pellets in sealed bags of different volumes. The packaging machine forms small bags of 15-25 kg, and bags of large volume (800-1000 kg).

Filternation of dust is one of the challenges during the manufacture of pellets from wood and plants. As a solution – a dust collector (cyclone) and pulse dust filter. In order to clean air water filtration of dust is used, which is formed during the drying and cooling. (The process of pellet production, 2007)

3.3. Advantages of pellets

Pellets are much greener than traditional fuels: 10 - 50 times less carbon dioxide emissions into the air space in 15 - 20 times less than the formation of ash than coal combustion.

The combustion of 1 ton of pellets released as much energy as burning 1.6 tons of wood, 480 m3 of gas, 500 liters of diesel fuel, or 700 liters of fuel oil.

Pellets are produced without using chemical fixers. In addition, pellets are extremely dense and can be produced with a low humidity content (below 10%) that allows them to be burned with high combustion efficiency.

The burning of wood pellets in special burners achieves efficiencies of up to 94%, while the amount of ash does not exceed 3% of the total volume used pellets. The resulting bottom ash could be used as an excellent fertilizer for the soil. When storing, the pellets do not ignite spontaneously when the temperature rises. They do not explode, unlike gas, diesel oil, etc.

Pellet heating is easy to automate, which makes them easy to use in the private sectors, the granules can be stored in close proximity to residential premises. They occupy less space during transportation and storage than other fuels. Pellets are easy to transport over long distances and to automate boilers that work for them. The burning of wood pellets in special burners do not need on a daily basis to remove ashes and add fuel. Pellets do not contain dust and spores that cause allergies in humans, as well as have no smell, unlike standard fuels.

According to its thermal properties pellets surpass even coal (calorific value is 5 kWh per 1 kg), and their environmental friendly benefits are beyond the competition. (Pellets, 2011)

The consumption of wood pellets as fuel is growing in enormous pace. In Russia, stocks of raw materials for biofuels are huge, estimated they have billions of cubic meters. Now in each hectare of harvesting is 40 - 60 m3 of waste lumber. Internal market of pellets in Russia is actively formed and will soon begin to expand. Using biofuels derived from forest wastes for heat supply of cities and towns, Russia could save per year 15 - 20% of traditional fuels.

Purchase price for Russia is above 3000 rubles (about 74 €) for 1 ton of pellets, while in Europe it is from 150 euros per ton.

In Russia the pellet market is already formed and actively growing. This is directly related to the increased use of pellet fuel for heating houses and country homes. Most know those houses can be heated by boilers, fireplaces, wood-pellet, and there is a necessity to buy this equipment. In Europe this method of home heating is a common cause, and in all major supermarkets, pellets are sold in packages of different sizes. (Feedstock opportunities for wood pellets production, 2007)

IV. Development of pellets production and their usage in Finland

4.1. Pellet production in Finland

In 1998 the wood pellet production was born in Finland. It started from export of pellets to Sweden, as the pellet markets there were developing fast. Following, pellet production has increased progressively, coming to 376 000 tons in 2008. The mainstream of Finnish pellet production has been exported. As the pellet markets in Europe started to boom, consequently the number of export countries of pellets increased. Export countries are Sweden, Denmark, the Netherlands, the UK and Belgium. Those countries have a higher taxation of fossil fuels in energy production. Especially in Sweden and Denmark, the taxation of fossil fuels for heat production is surprisingly higher than it is in Finland.

In 2009, there were 24 wood pellet mills in operation and the total production capacity was about 715 000 tons. Wood pellet production in 2008 was 373 000 tons, which was about half of production capacity. In 2009 few pellet plants had to stop production for some time, as there was a shortage of raw materials. (Eija Alakangas, 2009)

Finland has climate and energy targets of reducing overall emissions of greenhouse gases to at least 20% below year 1990 levels by 2020, by raising the share of renewable energy in the gross final consumption. The renewable energy target is 38%. In 2008, the National Climate and Energy Strategy was introduced. In year 2007, the share of renewable energy in the gross final energy consumption was about 25%. (J. Heinimö, 2009)

About 50% of the total primary energy supply (fossil fuels – oil, coal, natural gas) in Finland is imported. The main local energy resources in Finland are wood, peat, hydropower, and wind energy. In 2007 of all energy consumption 25 % was renewable energy sources, it was the third highest percentage in the EU.

4.2. Domestic consumption

The pellet market in Finland is behind the markets in Sweden or Denmark. Even thou Finland has all the technical resources, the yearly production is quite low. Today, pellets are produced at 13 sites.

Fig.6 Map of the largest pellet plants in Finland (S.Cavonius, 2010)

Vapo is the leading supplier of biofuels in Finland, Sweden and Estonia. They sell to private individuals and municipalities. (Vapo 2011). In 2009, 140 000 tons of pellets were exported. In 2010 about 23 000 Finnish small households were heated with pellets. (Skogsenergi, supply chain management 2010, S.Cavonius, K. Pietilä, M. Rosenlew, p.12)

The domestic consumption is developing slowly in Finland. Total consumption was approximately 150 000 tons in 2008. Therefore Finland is a big pellet exporting country. The main export destination countries are Sweden, Denmark, UK and Belgium. Consequently, the improvement of the domestic market use is an important task for the Finnish pellet industry. Constant domestic demand has to be developed in order to reduce the threat of depending on pellet export, which will became an issue due to increasing pellet production capacities in countries such as Russia. (Heinimö, 2009)

4.3. Customers in Finland

Lokapelletti Oy is a company located in city Laitila. The company sells pellets at price 120 € per 500 kg. (Lokapelletti Oy)

Also as potential clients would be suitable chain such as K-maatalous, the company has storehouses all over Finland, in cities such as Forssa, Hämeenlinna, Joensuu, Karjaa, Kokkola, Kuopio, Lapeenranta, Loimaa, Oulu, Porvoo, Savonlinna, Tampere, Vaasa, Ylivieska, Huttinen, Iisami, Jyväskylä, Kauhajoki, Kouvola, Lahti, Nurmijärvi, Pori, Salo, Seinäjoki, Turku and Vantaa.

Another chain is Argimarket, the company sells Vapo's pellets.

Rautia chain is also an expected potential customer that could purchase pellets from Russia. Rautia has more than 120 stores all over Finland. Starkki is another chain that sells pellets and has over 20 points of sale in Finland.

V. Import of pellets from Russia into Finland

5.1. The situation connected with pellets import into Finland

Given the substantial production of pellets, pellets in Finland are still growing. Due to the fact that overseas the price of pellets is quite high, and there is not a high demand

from domestic consumers, the bulk of production is exported. According to optimistic forecasts of Finland in 2010, the tenth part of European consumption (300 tons) will be provided with the country's manufacturers.

The goal is quite real, due to the fact that Russia's prospects in the processing of biomass are almost unlimited. This is due to the fact that the total forest growth is far ahead of harvest, and harvested wood is not used efficiently. Bio-fuel stocks are expressed in millions of cubic meters. On each hectare logging remains to 40-60 m3 of waste lumber. In other words, potentially 5-6 tons of pellets could be produced (to produce a ton of pellets takes an average of 7.5 m3 bulk sawdust).

In Russia there is a large company engaged in producing of pellets. It is called Ltd. "BioCalorien" its located at the Leningrad Region, Podporozhje town.

Fig.7 Location of BioCalorien plant (Smirnov, 2010)

Podporozhje district has calculated woodcutting areas that let produce up to 1 650 m² timber per year. The timber enterprises of the network stock from 700 till 850 thousand m² of trade timber per year (depending on the weather conditions).

According to its resource of timber and wood-processing and woodcutting factories which are located in frames of economical availability Podporozhje district is one of the

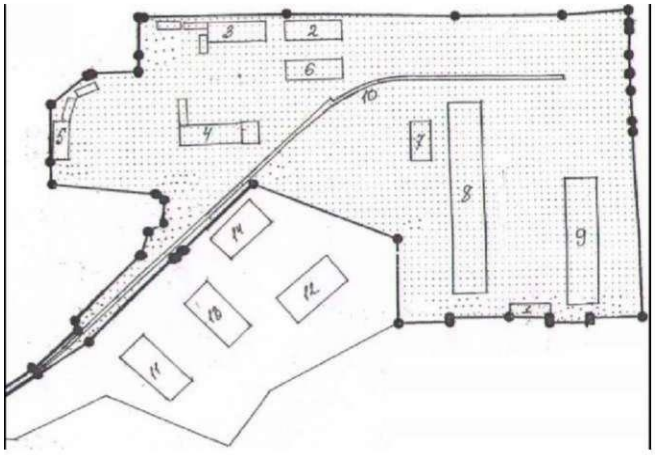
most perspective areas for the development of the factory by profound wood-processing including the processing of fuel briquettes and pellets.

Transport infrastructure in Podporozhje area contains the large-scale railway junction that is the joint of October RW and RW of Karelia Republic.

The river harbor of Podporizhje is situated at the Nikolskoje village and has got three loading areas. The nearest area “Black coast” is situated 1 km further from Ltd. “BioCalorien”. The navigation along the river Swir starts its work since the 3d ten-days of April and finishes its work at the 3d ten-days of November.

At present the building of the trunk-railway “St. Petersburg – Petrozawodsk” has begun which will pass Podporozhje and will give the possibility to use the passing transport.

Nowadays Ltd. «BioCalorien» is an industrial site and network of equipment by the processing of woodcutting waste into biological fuel. The network is located at the industrial area of Podporozhje at the territory of the factory «KPD» that was earlier situated here.



On Ltd. Biocalorien`s production site the plant for processing of wood chips into pellets is mounted on the basis of the engineering solution of Swiss company Friedli AG Engineering und Anlagenbau and completed by the high-quality equipment of leaders in the manufacture leading in Europe.

Fig. 8 The plan of the production site (Smirnov, 2010)

The plan of the production site:

Loading area “Black coast”

Ship berth

1. administrative building
2. wood-sawing shop floor
3. lodging rooms (old entrance)
4. lodging of repair and engineering shops
5. garages for 8 machine-places
6. Warm stockroom
7. storehouse
8. Storehouse of the finished commodity
9. Shop of granulation and boiler room
10. railway branch and dead-end siding
11. Incomplete construction of bricks
12. Block of drying cabinets
13. Incomplete construction of bricks (mud room)
14. metallic hangar

The plant has a section of the boiler which is intended for the burning of unusable wastes from lumbering in order to produce the heat energy that provides technological necessity and heating of the workplace.

Fig. 9 The boiler (Smirnov, 2010)

There is a section of reception and drying of technological dunnage, that is intended to clean the raw material from large inclusions and its drying to necessary humidity under the condition of preserving of technological value.

Fig. 10 The charging hopper of the line production line and the charging hopper of boiler room

Fig. 11 The band dryer

Fig. 12 The ventilator of the dryer (Smirnov, 2010)

Fig. 13 Radiators of the dryer

Fig. 14 The aspiration filter, the bunker of thehammer mill, the hummer mill

Fig. 15 The eight-square bunker, the humidifier

The section of the granulation is intended for the processing of wood chips from dried process feedstock (cuttings) into pellets and for the unloading bagged or mechanic transport of the finished commodity.

Fig. 16 The housing for operators of the production line

Fig. 17 The pellet mill (Smirnov, 2010)

Fig. 18 The bunker of the finished commodity

Fig. 19 The cooler (Smirnov, 2010)

Then the cooled pellets through the system of conveyers move in the bunker of the finished commodity, with a loading system in transport, or on a semiautomatic line of packaging in sacks. The shipping of the finished commodity to consumers is produced with the automobile transport.

Fig. 20 The packing line

Fig. 21 The loading in bulk (loose shipping into machine)

The territory of Ltd. “Biocalorien” as an industrial site can be used for realization of the ecological and power projects that are connected with deep milling and waste reclamation of wood processing.

Table. 1 Product Specifications Ltd Biokalorien. Results of product analysis conducted by SGS-Laboratory: (Biocalorien, 2009)

Parameteres	Methods	As received	Dry basis
Moisture, %	(SS 18 71 70)	8,0	
Ash, %	(SS 18 71 71)	0,3	0,3
Volatile matter, %	(SS-ISO 562)	79,0	85,9
Total sulphur, %	(SS 18 71 77)	0,01	0,01
Gross cal value (kcal/kg)	(SS 18 71 72)	4466	4854
Net cal value (kcal/kg)	(SS 18 71 72)	4131	
Arsenic		< 0,016 mg / kg	
Cadmium		0,023 mg / kg	
Lead		< 0,024 mg / kg	
Chromium		0,52 mg / kg	
Mercury		<0,02 mg / kg	
Copper		0,59 mg / kg	
Nickel		0,24 mg / kg	
Zinc		5,9 mg / kg	
Vanadium		0,88 mg / kg	

5.2. The standards

There are several standards that are very important for pellets productions and sale. Önorm is of Austrian standard, as Austria being one of the leading pellets producing countries, the Önorm is highly reliable. They include the following:

Önorm M 7135DIN 51731

Standard DIN 51731, dealing with granulation wood, its characteristics cannot be taken as an indicator of quality, as such an important parameter as attrition, not determined. It also cannot be made independent control products in accordance with these rules.

ÖNORM M 7135

This norm regulates the quality of wood pellets with significant restrictions, such as abrasion. Attrition is a measure of the rigidity and stability of granules. Through the test apparatus, granules are subjected to certain loads, resulting in measured dust arising, which is indicated as a percentage. The lower the value, the more stable granules and the less dust formation there is during the injection.

DINPLUS

Certification Standards DINplus combines both of the above rules and adopt the most stringent value for the standard. Certification process takes place at the company – manufacturer of granules, and accredited by DIN Certco Institute. At regular intervals is independent monitoring to establish the quality of pellets. Symbol as the Commission on granulation PVD Pelletverband, Germany. The alliance that exists along with the German Union for energy (for systems granulation) Deutsche Energie Pellet Verband (DEPV) also set a symbol of quality, quality criteria for which are comparable to the values prescribed by regulations DINplus. In addition to compliance with the manufacturing process is crucial to have met the following traffic rules, since no high-quality pellets cannot be destroyed by improper handling during transportation.

ÖNORM M 7136

Transportation and storage granules Criteria standards DIN, O Norm and DIN plus the production and the state of pellets until their shipment to the factory. Subsequent transport of granules to the final customer / agent and to further distribution are regulated by this norm. If in-transit or storage there may be a significant loss of quality. It may require interim storage, vehicles and personnel. Provision should be mounted on a truck On – Bord of dosage units for sorting grains, providing moisture protection, hood. The aim is to achieve the standards of professional handling of the granules. (Standards)

Countries such as Finland and Denmark , both big producers of pellets, have decided to wait for the European pellets standard (included in the Standard for solid biomass fuel, CEN/TC 335). (Quality standards for pellets in European countries , 2011)

In Finland there have been activities to define good practice guidelines and internal factory instructions for quality control, and these are still used by the market actors in their daily work. A public instruction for pellets quality was developed in 2001-2002 by

FINBIO – The Bioenergy Association of Finland. Instruction includes several similar rules as internal instruction of some pellet producers. The quality of pellets was divided into two categories and border values were close to the Swedish Standard for pellets.

VI. Penetration of imported Russian pellets to Finland

In the coming years the amount of wood waste is expected to increase by reducing the export of round logs and increase the number of sawmills and processing facilities in Russia.

The price levels vary in different countries, therefore trading occurs to those countries which have higher price level. In Russia prices are generally lower. Finnish wood pellet produces can export only to countries, which favor high quality. Thus can pay higher prices than on average in the market.

Finnish national incentives do not support use of pellets for heat and electricity production. About 70% of Finnish wood pellets are exported to countries like the Netherlands, Belgium, Poland and UK, which have support for RES (Renewable Electricity Standard) electricity production or to heating sector in Sweden and Denmark, which have much higher CO2 taxes for fossil fuels than in Finland. In Finland the Government is currently reconstructing energy taxation, and CO2 tax will be increased, but not to such a level as in other countries.

In Finland trade of round wood from Russia has almost stopped because of trade duty fees. Because wood chips (including pulp chips) have lower export duty (5% of price) the import of chips for energy use has increased from Russia.

The shipping route fees, port charges and train tariffs for transportation of wood fuels are higher in Finland than in other parts of Europe especially when exporting.

The fees for shipping and ports services are lower in Russia, if you export regularly and several times a year. Also the train tariffs in Finland for transition trade are double compared to Russia.

Quality standards and sustainability criteria were not seen as a barrier but rather an opportunity. Of course, if pellets are sold into many different countries with different

standards, fuel analysis costs will be higher, because different requirements and different analysis methods applied.

In the domestic market one barrier for market actors is to gain information of local wood fuel potential and availability for sales. This information is not publicly available for all market actors. Especially traders would appreciate information about thinning, which needs to be carried out in private forests and whether they are willing to sell wood from their forests. Most wood fuel production is connected to round wood procurement, where logging residues, stumps and other unmerchantable wood are harvested for energy.

The possible ways out include the following:

Use of biomass could increase in Finland, because of the high potential. It is also important to develop incentives in Finland, which support the bioenergy use in the sector outside the emission trading system (ETS) that use of biomass fuels is also increasing in this sector. (Eija Alakangas, 2009, pp. 22-23)

6.1. Cost of pellets EX FACTORY

According to the Ltd. Biocalorien, the production cost is around 68-70 e. Biocalorien has Swiss and Austrian standards. Packing in big bags and to bag from 3 to 50 kg. Ltd. Biocalorien has production capacity of 25 000 ton per year, or 2 000 ton per month.

6.2. Transportation methods

On the territory of Ltd. Biocalorien railroad siding facilities in length 639.3 m. are located. The line end is equipped with rack.

Auto-roads and pass ways activities in the territory of the network are organized with bulk-technique and provide production requirements of the network.

In close vicinity to the network (no more than 1km.) there is the moorage wall (area «Black Coast») of the Podporozhsky river port, that is equipped for a supply and handling of cargoes.

Table. 2 Loading standards for pellets (Packing pellets, 2011)

Transportation type	Lenght	Quantity	Brutto weight, kg
Car transportation		24 big-bags	21 000
Covered wagon storage capacity 128 m3	13 844 м	48 big-bags (12 rows)	40 200
Covered wagon storage capacity 138 м^3	16 080 м	52 big-bags (13 rows)	44 200
Covered wagon storage capacity 158 м^3	17 680 м	56 big-bags (14 rows)	47 600
Railway grain (Hopper) capacity of 92 m3		In bulk	Up to 50 000

Considering the transportation possibilities, there are two transportations options: railway and shipping.

6.3. Transportation costs

Cost of delivery to St. Petersburg is 400-500 rub per ton (11€), port charge (transfer of cargo) in St. Petersburg is quite expensive, 16 € per ton. There is a possibility to transfer cargo from port Ust-Luga (100 rub per ton/ 2,45€ per ton).

The cheapest transportation method is shipping followed by railways.

Indication of prices for 2011: FREIGHT Podporozhye-Hamina 22-23 € / ton for shipload of 2000-3000 tons. Loading at the port Podporozhye with registration is 3 €/ ton. Prices are obtained from Keystone Logistics Ltd and North West Shipping Co.

6.4. Customs duty

If Finland purchases pellets from Russia, they will go through customs in Vainikkala. During the import duty, customs will create an Invoice where 23% of VAT will be added. The VAT will be placed on the buyer.

Duty imports of wood pellets from Russia to Finland does not apply customs duty, therefore it is 0%. (Raunio, 2011)

6.5. Analysis

The average price of pellets in Finland is 300 € per ton. (Pellettitietoutta) The price of Kardonar Bioenergysolutions is 249 € for 990 kg. Kymen Pelletti Oy price for 1 ton is 310 €. The prices mean EX WORKS, so if a private customer requests home delivery extra delivery charges will be applied. The factors affecting the price are also price of oil and electricity, as one needs electricity to produce and oil to deliver. If the cost price is 70 € per ton at Biocalorien, the price is very competitive in the Finnish market and smaller chains will be interested in purchasing at lower cost and re-selling.

Cost price (70 €) + delivery costs (22,5 €) + loading and registration (3 €) =95.5 € The selling price for customers will be 130 € per ton.

The net turnover for 1 month is (130 € x 2000t) = 260000

260000€ - costs (191000 €) = 69000€ / month

Revenue for 1 year 828 000 €.

If we take an average price of 1 ton of pellets on Finish market as 300 €, then we deduct the Value added tax, which in Finland is 23%, the net price will be about 222€. Hence there is a big difference of almost 92 € between Russian and Finnish price for 1 ton of pellets. Which is a clear verification that there is big potential for Russian companies to enter the Finnish wood pellet market.

VII. Cultural business differences between Russia and Finland

In the following chapter an important aspect of cultural differences will be explained. In order to enter a foreign market one should be well aware of the traditions and features of country of destination, as minor mistakes could turn the deal into a fiasco. Business cultures of any national market community, including Russia and Finland, can be characterized by two main criteria: the traditional and temporary.

The traditional distinctions are laid in every culture in the way of historical development and may include features of territorial, ethnic, demographic, psychological, religious, social, ethical, moral, legal, and all others. (Distinctive features of Russian business culture I. Bakalinsky, 2001)

Table. 3 Cultural orientation model Finland vs. Russia

Cultural orientation model	***Finland***	***Russia***
Environment	Control	Constrained
Time	Fixed	Fluid
Action	Doing	Being
Communication	Low context, Direct, Formal	High context, Indirect Formal/Informal
Space	Private	Public
Power	Hierarchy	Hierarchy
Individualism	Individualistic	Collectivism
Competitiveness	Cooperative	Competitive

Structure	Order	Flexibility
Thinking	Linear	Linear, systematic

Finnish business culture in brief:

Finland is a low-context cultural country, thus making the business ethics very formal. In business meetings presentation is vital and one is expected to be polite and punctual. Sarcasm and joking is not tolerated, as this gives an impression that one does not take the event seriously. Some light joking is aloud if the workers know each other and have developed a relationship. Men and women are treated as equals in Finland, and discrimination is not allowed.

The dress code is also very proper, a dark suit with a tie. Extreme piercings and hair colors do not give a good impression, and the employees should be clean-cut shaven. Women should either wear a suit or medium-length skirt, not excessive amounts of jewelry or makeup. The hair should usually be tied up in a smart way; however in today's society this has become more lenient.

In business meetings Finnish people, like the Germans want to keep on the topic and settle agreements as fast as possible. The Swedish prefer to negotiate for hours before concluding, which often clashes with the Finnish ideology. Being on time is extremely significant; employees are expected to arrive five minutes before the meeting begins. If one comes late to a meeting, this is seen as being disrespectful as it causes an interruption. The way to great another employee is to firmly shake hands and to have eye contact. Finnish people are known to be rather secluded people and do not like too much physical contact and therefore a small distance is kept until a relationship is developed.

Finn's are extremely honest people to work with and expect to receive the same kind of honesty from the clients. In order to earn the trust and respect of an executive, one should be humble and obey given advice and instructions. Relevant questions can be asked as this prevents mistakes from happening. During a business lunch, the atmosphere can be

less formal depending on the person. However in all cases, the executive taking out the potential clients for lunch, should act as the host and make sure everything is running smoothly. Often in the beginning, the participants generally talk about anything and everything, however as time progresses, so should the business concept. Sometimes the actual business case can be fully settled, depending on the potential client. (Leney, 2005)

Russian culture in brief:

The Russian business culture is currently in the second stage of development. People explore the life, market, economic laws, experiment, make mistakes, learn to find their own way of entering into a civilized market. At the same time, such economically developed countries live at least in technologically advanced societies.

Therefore, they are not bad and not good, they're just different, they cannot be compared to the same parameters. They play in the business and are not really angry if something does not work. They are pushing for excitement, rather than prudence.

- Specific sense of humour
- Strong, but open and sincere people
- Friendly, witty and hospitable; sometimes seen as sneaky and mean
- People do not wear fake smiles. If somebody smiles he really feels good
- Consider themselves as a well educated nation
- Russians usually do not hesitate to say what they think in a way that doesn't leave room for any misunderstandings
- Most people do not know any foreign languages, but still are very friendly with foreigners
- Men can swear a lot amongst themselves but not in presence of women

- They don't have a deep respect towards any law, including traffic rules

(Distinctive features of Russian business culture I. Bakalinsky, 2001)

VII. Conclusion

In today's world one of the most important challenges is to preserve the environment that would ensure a safe and comfortable existence not only for this generation and the next generations, but generations of our distant descendants. However, all the increasing demands for comfort have led to a deterioration of environmental conditions on our Earth. One example is the so-called "greenhouse effect". Its danger lies in the impending increase in temperature of the planet. It is believed that reducing the "greenhouse effect" will serve as a replacement of traditional, non-renewable (oil, gas) energy sources with modern, high-tech fuel sample.

This type of fuel is known as wood pellets, also known as European firewood. Pellets are called a timber industry compacted by cylindrical waste that meets certain requirements and are intended for use as a clean, highly efficient fuel. Wood pellets are confirmed by the very process of their manufacture as environmentally friendly. Sawmill waste and wood processing is grinding to a certain size. Grinding comprises chips, sawdust, small-diameter, non-conforming timber.

About 60 percent of the forest in Finland is owned by private persons. The government can control about one-fourth, and corporations and municipalities own most of the left territory. Since 2001 nearly 51.3 million cu m of round wood were cut each year. As the wood resources in Russia are much higher than in Finland, Russia is a good solution in saving Finnish forests and simultaneously saving the environment by purchasing Russian pellets at a reasonable price.

Generally, in Europe the standardization of fuel pellet quality is far developed. With the European Standard, an appropriate tool for definition of quality is available, which provides the possibility to define the specific quality needed. The standard allows the manufacturer and the consumer to agree upon the quality needed from case to case.

Now the import of pellets from Russia to Finland is developing much better than it was previously as this year Russia has cancelled the increase of import tariffs that will help

the economies of these two countries to reach a new stage of pellet production and manufacture.

Each year Finland is moving further to meet the European standards and demands, so it is using biofuels that are economical and much more useful. It will save not only money, but the environment people live in.

VIII. Recommendations

After investigating the Finish market, it is first of all clear that in order for Russian company Biocalorien to enter to market, their pellets should be approved by the VTT, which is Technical Research Centre of Finland, more precicely with the help of VTT Expert Services Ltd (part of VTT Group). Finland is a European country; hence they prefer reliable products with certifications and approvals. This procedure is fast and will not require big payment. A small sample should be delivered to VTT and in a short while the approval will be done. In addition, VTT Expert Services Ltd can provide with Conformity assessment services for the products and production and support for market launch, which might also be quite useful for a foreign country in the Finish market.

The market launch requires an investment from the Russian company in order to succeed an effort input is necessary. After getting the VTT approval, the company should invest in marketing, as the product should have a brand, for instance a catchy brand name is highly preferred by Finish customers. As an example, Ladoga pellets or Nikolskoje pellets are known names, therefore easy to remember.

Moreover, the company should consider building a warehouse, for instance in Hamina. Where stock of pellets would be kept, in order to provide clients with a nonstop supply. All of the above mentioned are one time investments and considering the price competitiveness of Russian pellets, the investments will pay back rather soon.

Concluding, as the wood resources in Russia are much higher than in Finland, Russia is a good solution in saving Finnish forests and simultaneously saving the environment by purchasing Russian pellets at a reasonable price.

For further research, it would be highly interesting to consider another neighboring country, Sweden as a potential client. As Sweden has far more developed pellet industry, because of the shortage of raw materials, Sweden's yearly import of pellets in 2007 was 400 000 tons and the figure keeps on growing every year. (M. Selkimäki, 2008)

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Appendices

Question Framework for VTT

Company interviewed: VTT **Date: 31.03.2010**

Person interview (Name and position): Mr. Carl Wilen

Interview made by: Irina Ratkovskaya

INTRODUCTION:

1. What is you title and what are your main duties at VTT?

VTT Bioenegry mamagment team.

2. What are the main projects you have been involve with lately?

I have been working at VTT since 1980, many various projects.

OVERALL IMPACT OF PELLETS:

3. What are the key issues in pellet market development?

Consumers ability to pay. For instance, pellets are more expensive than coal.

4. Please list the most important challenges/obstacles with import of pellets from Russia.

Logistics is one and sustainability question.

5. Do the challenges vary from country to country? (Please give examples).

Sustainability question, for example in Russia.

6. What are the challenges in use of pellets?

On big plants the storage. Private households, the price.

7. What is the primary consumer market for pellets in Finland? Private households, factories, buildings (rivitalot), heating factories)

Big power stations would be primary market.

8. What do you think about the price development of pellets? (Around 250-300 e per t) Cheaper that fossil fuels? Horizontal price?

In Finland coal is cheaper than pellets.

9. What are the benefits of pellets? (Less polluting option, no carbon dioxide emission?)

Advantage of pellet, high energy density and easy to handle. I would say the minor disadvantage is the emission of fine particles, however it is not a problem now, maybe in the future.

GOVERNMENT INCENTIVES

10. What is the support from the government with reaching the target of year 2020 (215 Mtoe of bioenergy, out of which 20 Mtoe will be imported) Is there a target for pellets?

No target.

11. What could be done better in order to reach the target? From the point of view of the companies, government?

From the government, is expected tax reduction/support.

CONCLUSION

12. Is there anything else you would like to mention/add?

Importing pellets from Russia to Finland, possible if it's cheap, one company should find the right alliance.

Thank you!